

PATENT

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Group Art Unit: 3724
Examiner: Hwei-Sui Payer
Applicant: Zhang et al.
Title: CUTTING DIE AND METHOD OF FORMING
Atty. Docket: BERL-18A

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

**DECLARATION OF NONOBVIOUSNESS
UNDER 37 C.F.R. §1.132**

I, Dr. C. Rey Hsu, hereby state and declare the following:

I received a B.S. in 1981 and a M.S. in 1986 in Physics, with an emphasis in laser optics, from Fu-Jen Catholic University in Hsing Chunf, Taipei, Taiwan. I received a M.S. in June 1991 and a Ph.D. in 1996 in Welding Engineering from The Ohio State University, with a major in Laser Materials Processing and Minors in Weld Design and Electrical Engineering. I am a member of the following professional organizations: American Welding Society, Laser Institute of America, Fabricators and Manufacturers Association International, IEEE, Peer Review Committee of the Journal of Taiwan Cutting and Welding, Peer Review Committee of the Gulf Coast Maritime Technology Center of the University of New Orleans, and visiting professors at Harbin Research Institute of Welding in China. I have published over 30 articles in laser welding and cutting areas, hold 2 patents and two pending patent applications.

I have been employed by Bernal, Inc. since November, 2002. From 1999- November 2002, I was a General Manager for Focal Laser Innovative Solutions, LLC, which is

I have been employed by Bernal, Inc. since November, 2002. From 1999-November 2002, I was a General Manager for Focal Laser Innovative Solutions, LLC, which is in the business of development and implementation of laser technologies to a wide range of applications. During that time, I consulted with Bernal, Inc. on their laser cladding technology. From 1997 to March 2001, I was Senior Project Manager for the Laser Welding and Cutting Group of Fraunhofer USA, Center for Laser Technology. For two years prior to that, I was Project Engineer in the same group. From 1988 to 1995 I was a Graduate Research Associate at the Ohio State University. In 1987, I was a Design Engineer for Delta Electronic Industrial Inc., and from 1985-1986 I was an Optical R&D Engineer for Pacific Laser Electro-Optics Inc. Through my education and professional endeavors, I have developed expertise in the following areas: Laser Welding, including that commonly used on the Photonics industry for glass-to-silicon welding; laser materials processing, welding metallurgy, laser training, and laser optics.

I have reviewed and understood the subject matter of Bernal's pending U.S. Patent Application No. 09/160,991, Baker U.S. Patent No. 3,952,179 and Maybon U.S. Patent No. 4,323,756. I make the following comments based on my education, knowledge and industrial experience in the laser processing and welding fields:

1. Baker's welding process cannot deposit blade material from powder form, and in particular the hard carbide-containing powder materials, whereas the laser cladding process disclosed in Bernal's pending application can deposit blade material from a powder form. The highly abrasion-resistant materials, such as carbide-containing materials, are expensive and are generally commercially available in powder form. Known conventional welding processes, such as that described in Baker, use material in wire form. These generally available welding

wires comprising relatively low hardness materials. Conventional welding cannot be accomplished with powder metal source material.

2. I requested that the Chinese Welding Institute make a welding wire from each of CPM9V, CPM 10V, and CPM15V, which are hard vanadium carbide-containing materials. I attempted to form an integral cutting blade on a die body by conventional welding using this welding wire as the blade material source. Significant spattering of the blade material occurred, and I was not able to weld-deposit a usable cutting blade with the wire made from these hard carbide-containing materials. It is my experience that the high heat of the welding pool makes it impossible to weld using these types of hard materials, in particular the carbide-containing materials.


Further Declarant sayeth naught.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date:

10/22/2004


C. Rey Hsu, Ph.D., Director of R&D
Bernal Inc. / A Cerutti Group


Rene Maki
Notary Public

RENE M. MAKI
Notary Public, Oakland County, MI
My Commission Expires Oct. 6, 2006